COLORADO DEPARTMENT OF HEALTH
REVIEW AND COMMENT
TECHNICAL MEMORANDUM (TM) 8 - REVISED PHASE II RFI/RI WORK PLAN
(BEDROCK)
OPERABLE UNIT 2, MAY, 1993

GENERAL COMMENTS

1. Assumed pre-existing conditions must be clearly delineated for each potential scenario at some point early in this document.

Response: Assumed or observed existing site conditions for scenarios 1 and 2 are discussed in the Executive Summary on Page ES-4, and in Section 1.2.1.2 on Pages 1-53 and 1-56. These have been clarified.

2. The objectives of this Revised Phase II Bedrock Work Plan are not clearly stated anywhere in the document. From the Division's perspective, the principle objective of this TM is to gather enough data to confirm assumed conditions and concepts. If this can not be accomplished, then more data will be collected via a contingency plan. Secondary objectives in support of the principle objective include:

   A) establishing the lateral extent of contamination in the "Type 1" scenario. If contamination is limited to a narrow area of LHSU sand in contact with overlying contaminated alluvium, conditions are probably as assumed in that the contamination is probably entering the LHSU sand where it subcrops beneath contaminated alluvium on the hillside. If clusters 2, 3, and 4 find contamination further away and upgradient from the subcrop, then possibly more information will be necessary.

   B) establishing vertical extent of contamination in LHSU units not in direct contact with UHSU units (Type 2 scenario), but under areas of extensive UHSU contamination. If contamination is not found in these deeper units, conditions are as assumed in that no contamination has penetrated the bedrock claystones.

   C) establishing LHSU permeabilities.

   This comment would directly affect the text in Sections 1.2.1.4 and 2.1.

Response: The objective of the Revised Bedrock Work Plan is to gather data necessary to sufficiently verify the assumption that no complete exposure pathway exists in the LHSU (see Executive Summary [Page ES-5], and Section 1.2.1.4 [Page 1-67]). This is consistent with CDH's principle objective (i.e., "... to gather enough data to confirm assumed conditions and concepts").

The objective is presented in Section 1.2.1.4, Objective of the Revised Bedrock Work Plan (Page 1-67). Additional language has been added to clarify this objective.

A contingency plan is now in the review process to address additional activities that may be performed in the event that the data collected do not confirm the assumed site conditions.

3. The Division has received correspondence from DOE indicating that work on this TM commenced during the week of April 5, 1993. Therefore, the Division recommends that the contingency plan to be invoked should conditions differ from those assumed to exist be developed as soon as possible.

Response: The contingency plan is currently being developed and will be transmitted to CDH and EPA for review in May 1993.

4. The outlines consistently shown in this document for IHSSs 216.2 and 216.3 are incorrect.

Response: The outlines shown in TM-8 for IHSSs 216.2 and 216.3 are based on the previous Historical Release Report. The current Historical Release Report was conditionally approved in September 1992 and the outlines from that report have not yet been incorporated. The outlines shown in TM-8 will not impact the information gathered under TM-8. A revised base map showing the correct locations of the IHSSs will be prepared for the OU2 RFI/RI Report.

Specific Comments

1. Executive Summary: revised Figure ES-1 The Division does not believe the revised version of Figure ES-1 is sufficient. It is already known that there is contamination in the LHSU. Samples are being collected (with detectable levels of contaminants) from existing wells, so it is reasonable to expect that this will also be the case for at least some of the new wells. Therefore, a likely path for new ground water samples through the revised flow chart is straight down. The problem with the revised flow chart is that it makes no provision for LHSU contamination, but only kicks it into the "contingency plan" which is never defined. (This comment also applies to Figure 1-4).

   The footnote at the bottom of this figure indicates that the additional work required in the contingency plan is not included in the scope of this document even though, as described above, invoking the contingency plan is guaranteed.

Response: It is not likely that the contingency plan will always be invoked for each site. However, in the event that the expected conditions do not occur, a contingency plan is being prepared to supplement the Revised Bedrock Work Plan. This will be a separate document to allow discussion of appropriate actions while allowing TM-8 to be approved and implemented.

2. Page 1-53 With regard to the potential contamination sources to the LHSU, please explain why cross-flow from upper zones to lower zones via old wells and boreholes has been disregarded. This was a mechanism considered in the original workplan and still seems reasonable.

Response: A potential location for cross-contamination due to improper well construction is at Well 2087, where contamination has been detected in an apparent LHSU claystone (39 ppb or less of PCE, 5 ppb of TCE). However, at this time the source of contamination in Well 2087 is uncertain. It may be that the contamination is due to 1) vertical migration of contaminants from the UHSU through fractured LHSU claystone, or 2) vertical migration of contaminants from the UHSU through an improperly constructed well annulus in Well 2087. The lithology of the screened interval of Well 2087 is uncertain; it may be claystone, as logged, or it may be a LHSU sandstone, as recent mapping of sandstone geometries suggests. To reduce the uncertainty associated with Well 2087, WC-5 will be drilled to investigate the source of contamination. Well WC-5 will be drilled about 100 feet from 2087 to test the LHSU at the same elevation as the screened interval of 2087. If contamination is detected in Well WC-5, it is an indication that contaminants have migrated vertically from the UHSU to LHSU in fractured claystone. If contamination is not detected in WC-5, it is an indication that the contamination detected in Well 2087 may be related to migration of contaminants within the well annulus.

3. Page 1-66 The second paragraph on this page should be revised. Only two of the five elements of a completed pathway are probably not present. Since the LHSU ground water is already contaminated in certain areas, the source of contaminants is present. Additionally, to be consistent with other portions of the text, at present, because the pathways are probably not complete, no quantitative risk assessment of the LHSU is planned. However, should the situation change, this will be re-evaluated.

Response: The text has been changed to reflect these comments.

4. Section 2.2.2.1: WC-5 and WC-6 The locations of these well clusters are approximately 300' and 200' distant from wells 2087 and 02991, respectively. These distances are large when dealing with the subtle and rapid lithologic changes that occur in the bedrock units. If the pilot boreholes at these locations fail to find sufficient sand thickness in the LHSU at the appropriate stratigraphic level, we suggest drilling a second pilot borehole at a different site, possibly closer to the control wells, before decisions are made on the compliance of this site with the workplan assumptions.

Response: The locations of Wells WC-5a and WC-6a are approximately 100 feet and 120 feet from existing Wells 2087 and 02991, respectively. The purpose for Well WC-5a is to verify the presence and evaluate the source of contamination previously identified in LHSU claystone in Well 2087. Because one of the possible mechanisms for contaminant migration to the LHSU at Well 2087 is through an ineffective well seal, it is necessary to locate WC-5a upgradient and away from 2087

so as to be outside of its potential area of influence. The issue of potential rapid lithologic changes and sandstone thickness is not relevant to WC-5a because the well is designed to test the same elevation interval as 2087, regardless of the lithology at that elevation.

Well WC-6a is designed to test the LHSU beneath an UHSU hotspot where LHSU sandstone is believed to be in close proximity to the UHSU. In addition, this location was selected because it is adjacent to and downgradient of IHSS 109, where volatile organic chemical free-product was observed during drilling of source borehole 10191. If sandstone is not encountered in the LHSU at the elevation interval expected, we believe Well WC-6a should be installed in the first identified substantial LHSU permeable zone at that location so as to investigate the potential for vertical migration of contaminants from IHSS 109. With regard to the issue of potential rapid lithologic changes, we agree such changes occur at OU2, and this forms part of the basis for the assumption that the LHSU is not a complete exposure pathway. If drilling at location WC-6 indicates that sandstone is not present at that location, then this supports the assumption that the LHSU is not a viable exposure pathway for migration of contaminants from the IHSS in that area.

5. Section 2.2.2.2 Verification that the well clusters for this scenario are truly upgradient of the existing wells is necessary for the well cluster to perform its intended purpose. Please add text explaining how and when gradient will be determined between the new wells and the existing wells.

   As mentioned above, the new well clusters are planned at some distance to the control wells. Therefore, finding the same sand in the new pilot boreholes may become problematic. If the new pilot boreholes do not find the equivalent sand that is contaminated in the existing wells, the Division recognizes that an apparent upgradient sand limit could be present which would limit lateral migration. However, one point of control is not enough for a final determination. If the contaminated sand is not found in the new pilot boreholes for WC-2, WC-3, and/or WC-4, please drill at least one additional borehole no more than 200' west of the original pilot borehole (up-dip or along depositional strike) for stratigraphic confirmation purposes. If the second borehole does not encounter the contaminated sand, then we will be more comfortable with the sand body edge limiting contamination migration from another upgradient source."

Response: Based on the topography of OU2 and observed groundwater hydraulic gradients in the No. 1 Sandstone, which are toward Woman Creek in the vicinities of the locations for Wells WC-2, WC-3 and WC-4, we believe that hydraulic gradients within the LHSU sandstones that subcrop along the Woman Creek drainage are oriented from the central portion of the plateau toward Woman Creek. In siting WC-2, WC-3, and WC-4, we located them so as to be between the existing wells where contamination has been detected at the subcrops and the potential IHSS areas that could be the source of the observed contaminants. Following installation of the wells, we will verify that the new wells are upgradient of the existing wells on the hillside through water level measurements in the new and old wells. We acknowledge that we will not be able to calculate true

maximum gradients based on these two-point measurements. However, we believe that if contamination is not present within the LHSU sandstone between the IHSS and the existing wells, it is unlikely that it is migrating from the IHSS to the subcrop and, thus, is indicative that the observed contamination is due to localized recharge of colluvial water to the subcropping sandstones.

With regard to locating the same sandstones in WC-2, WC-3, and WC-4 as were identified at the subcrops, the sandstones may not be continuous between the IHSS areas and the subcrop locations. However, it is unlikely that contamination identified at the subcrops is migrating through LHSU sandstones to the subcrops if those sandstone are not present between the IHSSs and subcrops.

6. Section 2.3.2.2 This section should contain a concise description of how, or if, the pilot boreholes and/or wells at each cluster location will be sampled. Presently, the text is not clear on this point.

Response: Soil/rock sampling in the pilot boreholes is expected to be limited to collection of core samples for lithologic logging, collection of discreet samples for geotechnical testing, and collection of discreet samples for characterization of drill cuttings. Soil/rock sampling in the well boreholes is expected to be limited to collection of core samples across the proposed screen interval for verification of lithology. Discreet samples of soil/rock for laboratory chemical analysis will only be collected from pilot boreholes or well boreholes if field screening indicates that VOCs or radiological constituents are present in the LHSU core samples. This will be clarified in the text of TM-8.